

BSIT 5<sup>th</sup>  
Section A & B

LECTURE 04

# IP Addressing

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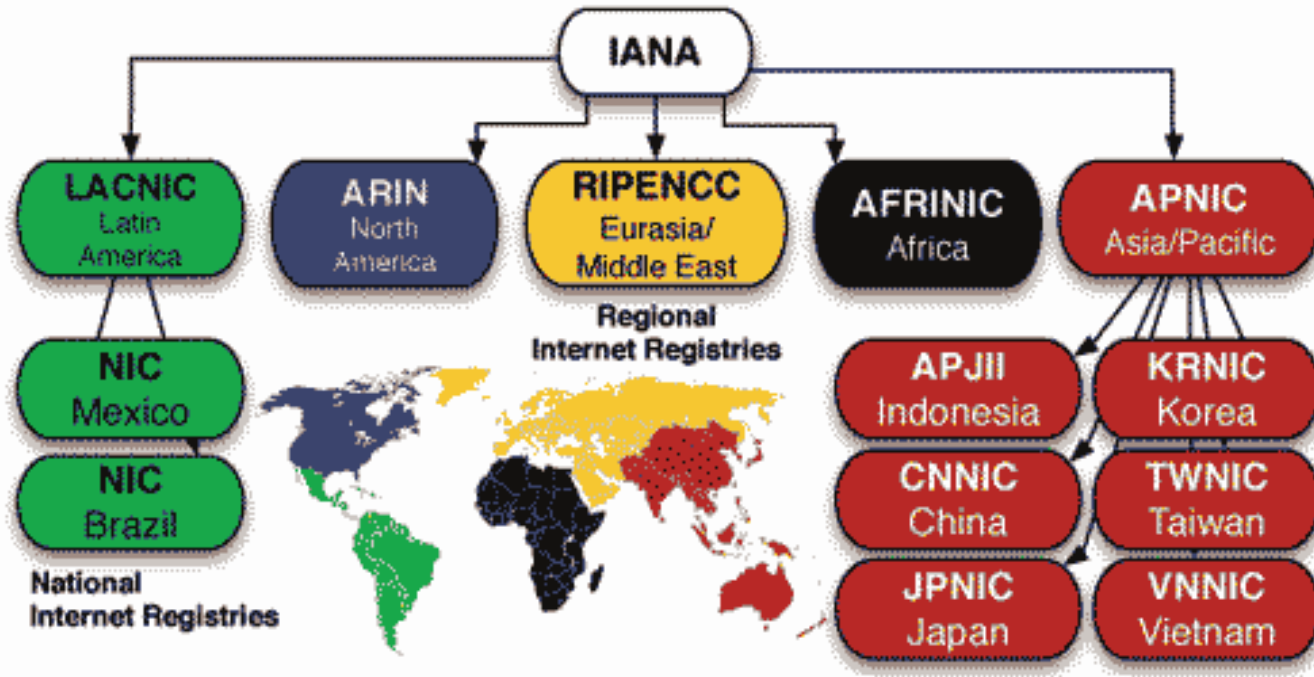
# What is an IP address?

- ▶ An Internet Protocol (IP) address is a unique numerical identifier for every device or network that connects to the internet or intranet.
- ▶ An IP address is part of the TCP/IP suite of protocols.
- ▶ It works behind the scenes, helping devices and websites connect with each other on the internet.
- ▶ There are two versions of IP addresses:
  - ▶ IPv4
  - ▶ IPv6

# Internet Assigned Numbers Authority

- ▶ The Internet Assigned Numbers Authority is a standards organization that oversees global IP address allocation, autonomous system number allocation, root zone management in the Domain Name System, media types, and other Internet Protocol-related symbols and Internet numbers.

<https://www.iana.org/>



# IANA Regions

# IPv4

- ▶ An IPv4 address is most often represented in decimal, in the following format:

**158.80.164.3**

- ▶ IPv4 is comprised of four octets, separated by periods:

First Octet	Second Octet	Third Octet	Fourth Octet
158	80	164	3

- ▶ Each octet is an 8-bit number, resulting in a 32-bit IP address.
- ▶ The smallest possible value of an octet is 0, or 00000000 in binary.
- ▶ The largest possible value of an octet is 255, or 11111111 in binary.

# Decimal to Binary Conversion

- ▶ The simplest method of converting between decimal and binary is to remember the following table:

128	64	32	16	8	4	2	1
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To convert a decimal number of 172 to binary, start with the leftmost column. Since 172 is greater than 128, that binary bit will be set to 1. Next, add the value of the next column ( $128 + 64 = 192$ ). Since 172 is less than 192, that binary bit will be set to 0.

Again, add the value of the next column ( $128 + 32 = 160$ ). Since 172 is greater than 160, that binary bit will be set to 1. Continue this process until the columns with binary bits set to 1 add up to 172:

Decimal	128	64	32	16	8	4	2	1
Binary	1	0	1	0	1	1	0	0

# IPv4 Classes

- ▶ In the IPv4 IP address space, there are five classes: A, B, C, D, and E.
- ▶ Each class has a specific range of IP addresses (and ultimately dictates the number of devices you can have on your network).
- ▶ Primarily, class A, B, and C are used by the majority of devices on the Internet.
- ▶ Class D and class E are for special uses.

Class A (0 – 127)

Class B (128 – 191)

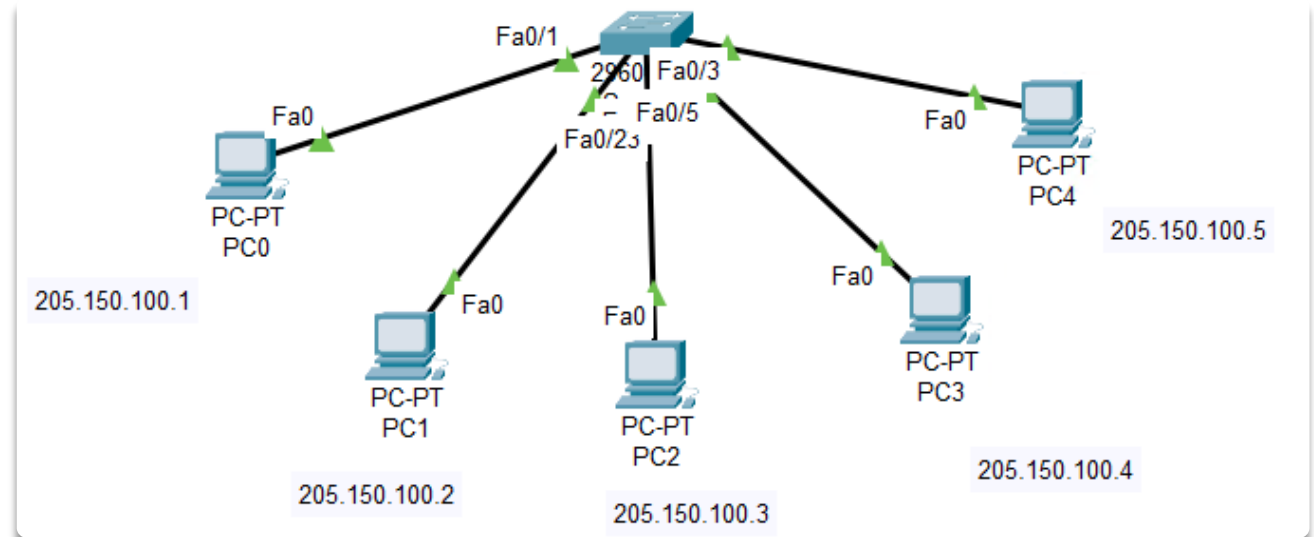
Class C (192 – 223)

Class D (224 – 239)

Class E (240 – 255)

# IP address components

- ▶ An IP address contains two components:
  - Network ID – identifies which network a host belongs to.
  - Host ID – uniquely identifies the host on that network.
- ▶ Class A: N.H.H.H
- ▶ Class B: N.N.H.H
- ▶ Class C: N.N.N.H
- ▶ Network Portion: Must be same in the LAN.
- ▶ Host Portion:
  - ▶ Unique
  - ▶ All bits cannot be ON (255) or OFF (0)





# Public vs Private IP Address

- ▶ An IP address is a unique numerical ID assigned to each device on the Internet.
- ▶ IP addresses can be public - used on the Internet, and private - used in a local area network (LAN).

Public IP vs Private IP	
Public IP	Private IP
Used over the Public Network ex. WAN	Used with in the private network ex. LAN
Recognized over the Internet	Not recognized over the Internet
Public IP are unique over the Globe.	Private IP are unique with in the network or LAN.
Public IP are paid.	Private IP are free of cost.
Assigned by Network Administrator.	Assigned by Internet Service Provider /IANA
Class A-- 10.0.0.0 to 10.255.255.255  Class B-- 172.16.0.0 to 172.31.255.255  Class C-- 192.168.0.0 to 192.168.255.255	RANGE-- Class A-- 1.0.0.0 to 9.255.255.255 11.0.0.0 to 126.255.255.255 Class B-- 128.0.0.0 to 172.15.255.255 172.32.0.0 to 191.255.255.255 Class C-- 192.0.0.0 to 192.167.255.355 192.169.0.0 to 223.255.255.255

# Subnet Mask

- ▶ A subnet mask determines which parts of the IP address are network and host identifiers

Class A (1-126)  
Default subnet mask

<u>Network</u>	<u>Host</u>	<u>Host</u>	<u>Host</u>
255	0	0	0

Class B (128-191)  
Default subnet mask

<u>Network</u>	<u>Network</u>	<u>Host</u>	<u>Host</u>
255	255	0	0

Class C (192-223)  
Default subnet mask

<u>Network</u>	<u>Network</u>	<u>Network</u>	<u>Host</u>
255	255	255	0

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*Thank  
you!*